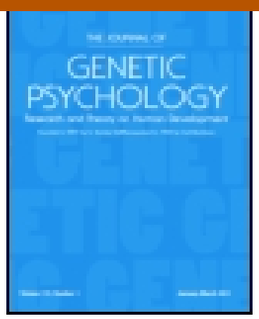


The Pedagogical Seminary

ISSN: 0891-9402 (Print) (Online) Journal homepage: http://www.tandfonline.com/loi/vzps20

The Child and the Weather

Edwin G. Dexter

To cite this article: Edwin G. Dexter (1898) The Child and the Weather, The Pedagogical Seminary, 5:4, 512-522, DOI: 10.1080/08919402.1898.10534033

To link to this article: http://dx.doi.org/10.1080/08919402.1898.10534033

THE CHILD AND THE WEATHER.

By EDWIN G. DEXTER, Greeley, Col.

In the following paper, which I hope will ultimately appear in a more elaborated form, I have attempted to show, by means of empirical data, the possible effects of abnormal meteorological conditions upon mental states. Every scientific problem partakes somewhat of the nature of a verification of popular opinion on a given subject, and this one is no exception to the rule. "I feel all wrought up, and fit for nothing, this kind of weather," is a statement we are all familiar with during the dry, windy spells to which our Colorado climate occasionally treats us, and we teachers are sure that during certain phases of the weather, our pupils (of course it cannot be we ourselves) are too exasperating for endurance, while a change in the meteorological conditions brings with it a smoothness and a tranquility of spirits which forms a marked contrast. That the weather has a pronounced effect upon physiological conditions few afflicted with rheumatism or diseases of its nature would for an instant doubt. Indeed, the truth is so patent that we need not give it an instant's discussion. That its effects are so marked upon mental states might be questioned, but that it has an effect of considerable importance is recognized, even by the matter-of-fact business men of our large mercantile concerns. For instance, in the Bank of England, certain sets of books, an error in which would be cumulative and produce disastrous results further on, are locked up, and the clerks set at tasks less intricate and important in character, during London fog, and on days when the weather is particularly depressing in its nature. Experience has taught those in charge that the per cent. of error increases manifold during such climatic conditions, and that it is money in pocket to conform to them. The same necessity for cessation of certain lines of work during bad "spells of weather," is recognized by the larger banking institutions in New York and the other eastern cities, and a rotation of work in conformity to them is rigidly observed. It has been the universal reply, too, by the superintendents of prisons and asylums for the insane, to whom I have appealed for their opinion upon the subject, that the persons in their charge varied so markedly with the meteorological conditions, that no man who had ever had their experience could for a moment doubt that the relation between weather and emotional states was any other than cause

and effect. When asked, however, what definite conditions of the weather tended to be most productive of emotional abnormalities, no satisfactory answer could be made, and we were as much at sea as ever.

A principal of one of the large boarding-schools for boys, a Quaker school in eastern New York, made some very interesting statements corroborative of the general belief I have already stated. They were given me by a former Colorado educator, who was for some years an instructor in the school just mentioned. He said the principal would occasionally come to him, with the assurance of one who knows, and caution him to look out for the boys, and particularly certain boys whom he called by name, saying, "There is likely to be trouble to-day." This had continued for some time, and every warning had proved timely, when the instructor's curiosity with regard to the principal's seeming prescience led him to appeal to his superior for the secret. The answer was that a careful observation for long years had proven to him that certain definite conditions of the weather, as revealed to him by the barometer of a gouty foot, brought with them, or were followed by, a tendency to unruliness on the part of the boys. He also stated that his belief that the weather produced these marked effects upon his pupils, had been intensified of late, since he had been suffering from a severe attack of insomnia, during which he had spent many nights walking the long corridors of the dormitories. Here, on those nights which his previous experience would leave him to believe would be followed by emotional abnormalities, he would hear the boys, from whom he was separated only by badly fitting doors with open transoms above them, tossing upon their beds in imperfect sleep, or moaning and talking in a manner quite unusual to them on nights when the weather was different.

But, you say, that accounts for their unruliness on the following day :— They did n't sleep well !

Yes; but why did n't they sleep well?

To be sure, an unusually indigestible supper, or even the worry over some unfinished task, for which he would be called to account on the morrow, might produce just this effect, but it could hardly be supposed that these facts would universally coincide with abnormal conditions of the weather, and it was the indubitable opinion of the good pedagogue in question, that it was to the latter cause, and not at all to the former, that the sleeplessness and petulance of his pupils was due.

It was the seeming certainty that such is the case, as shown by the incident just related, and observations of a somewhat similar nature which all of us have made, together with the fact that we have no exact knowledge of the definite meteoro-

logical conditions productive of such results, that led me to undertake the problem outlined in this paper.

Its solution is three-fold in its nature:

First. A determination of the exact weather conditions for days on which misdemeanors requiring corporal punishment have occurred in public schools of Denver since September, 1883, and a comparison of those weather conditions with the normal.

Second. A similar comparison for those days on which murders, suicides or attempts to suicide have taken place in the same city, within the same time.

Third. An attempt to study the same conditions in the same manner, with regard to their effects upon horses, as shown by the frequency of runaways.

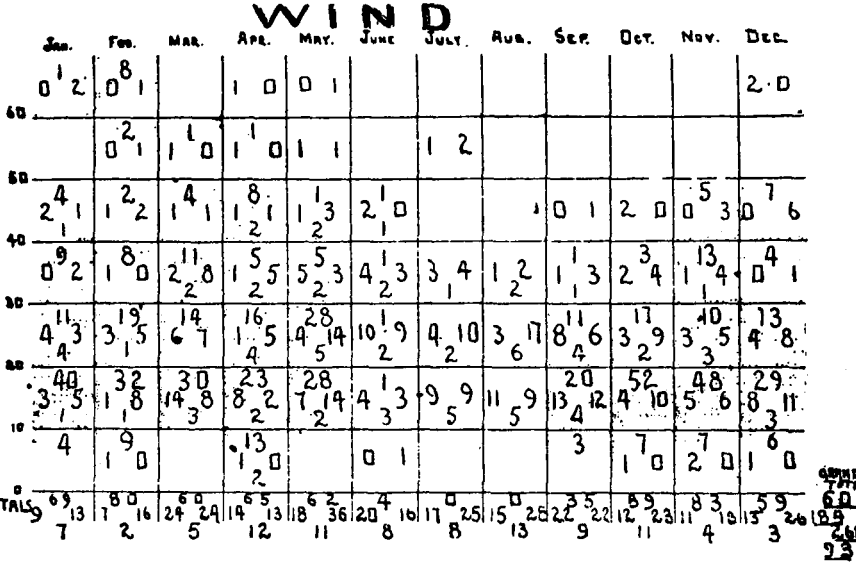
We fully recognize that all these effects might have been due, and perhaps were, in every case *directly*, to some other cause than the weather, but the question still confronts us, would those direct causes, for instance, the tendency to be insolent, on the part of the boy — the loss of position by the would-be suicide, or the sudden fright by the horse, produce the tabulated result had not the meteorological conditions brought about a nervous tension, tending to make these results more probable? Light can only be thrown upon this problem by generalizations made from a large number of observations. In the problem with the school children, which is the only one treated in this discussion, two facts tend to impair the validity of the data.

First. In the notes sent Supt. Gove (the only records available), the principals never failed to mention the exact date on which the punishment was administered, but in some cases, that of the misdemeanor was left uncertain.

Second. It is quite possible that the misconduct was, in many cases, only "the straw which broke the camel's back," and no worse than some preceding it which had been left unpunished. We can, however, suppose that some misdemeanor had been the immediate cause of the punishment recorded and tabulated, disregarding the possibility of others.

The records showed 606 cases of corporal punishment in the public schools of Denver, between Sept., 1883, and June, 1897. (See upper number marked "grand total" on plate No. 1.) Of these: 69 were in January, 80 in February, 60 in March, 65 in April, 62 in May, 4 in June, 35 in September, 89 in October, 83 in November, and 59 in December. (See upper numbers marked "total," at bottom of same plate.) Since the months of February, October and November show a somewhat equal distribution, and all the other months of the school year are broken into by vacations, except May, the data fail to show that the time of year has any marked effect upon the tendency

PLATE I.



to misdemeanor. The smaller number in May, may be due to a general laxing of school discipline toward the end of the school year.

The records showed neither the age nor grade of the offender, and the sex was so universally male, that that item has been disregarded. The character of the offense, too, was so varied that it was not shown in the table.

In tabulation, the dates of misdemeanors were set down chronologically in the left hand columns of sheets, ruled for the max. and min. barometer readings, max. and min. temperature, max. and min. humidity, maximum and total movement of the wind, precipitation, and character of the day. These columns were all filled in at the local office of the United States Weather Bureau, under the direction of its Assistant, Supt. P. H. Brandenburg, whose kindly assistance, as well as that of Misses B. Ida Jones and Helen Adams, teachers in the Denver public schools, I wish here gratefully to acknowledge.

In each of the tables used in illustration of this paper, the number near the tops of the small squares represents the number of misdemeanors in the public schools, the left of the two midway from top to bottom, the murders; the one at the right, suicides or attempts to suicide; the bottom one, cases of recorded horse-runaways in Denver, for the months shown at the

top of the column and meteorological conditions shown at the left.

In the preparation of these tables, profile paper was used, ruled in inches and tenths, and dots were put in for each class of data, to represent graphically the exact reading. Finally the dots were counted for each inch square, and the number set down as shown in the accompanying tables. In photographing the larger charts for these, however, the one-tenth inch squares and the dots, for the most part, failed to show.

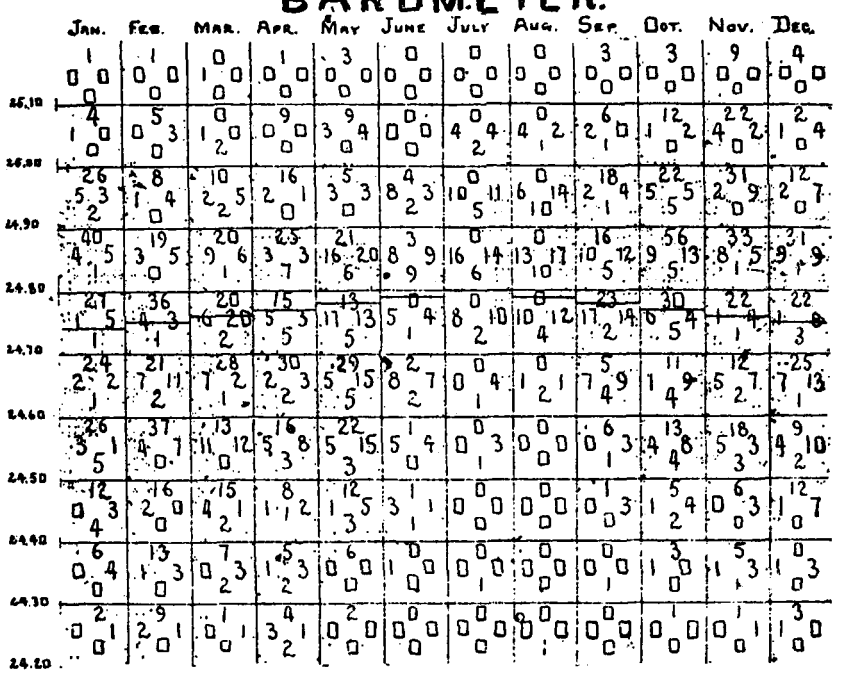
The table marked "wind" shows, at the bottom, the monthly totals for all classes of data, and in the corner, the whole number of observations for each class. Within the squares, the figures show the number of days having tabulated data, on which the wind reached a maximum velocity shown by the numbers at the left. A little addition shows us that the number of days on which this velocity was less than ten miles per hour, was 49; 10 to 20 miles was 302; 20 to 30 miles was 140; 30 to 40 miles was 60; 40 to 50 miles was 32; 50 to 60 miles was 4; more than 60 miles was 9. Since the mean maximum velocity for Denver comes within the decade from 10 to 20, we shall consider any reading within that decade, as normal. We find that just about one-half of the tabulations come within those limits (normal), leaving the other half distributed over the other velocities which might well be considered abnormal. But the records at the Weather Bureau show that 61% of the maximum readings are within our prescribed normal limit, giving us, from this generalization, a proportion of 6.5 in favor of abnormal anaemometrical conditions. Of these abnormalities, excessive velocity seems most disastrous, since the proportion of cases above the normal is to those below, as 5 to 1

Beside considering the maximum velocity of the wind, its total movement was also tabulated, although it does not show upon the plate. By "total movement" is meant the entire number of miles registered by the anaemometer for the day. For Denver, the mean total daily movement for the year is about 156 miles, being a little higher in the spring, and a little lower in the fall.

In tabulating the data, I find that 3 misdemeanors occurred when the movement was above 450 miles; 12 between 400 and 450; 23 between 350 and 400; 34 between 300 and 350; 40 between 250 and 300; 88 between 200 and 250; 79 between 175 and 200; 206 between 125 and 175 (normal); 83 between 100 and 125, and 37 under 100. I have considered daily movements between 125 and 175, normal. That is days which could neither be considered windy nor calm, but with the gentle breeze which is most pleasing. But 206 offences were committed under these conditions (one-third), while the government

reports show that 50.1 of the days fall within them. By this calculation we have a proportion of 5.3 (about) in favor of abnormal anaemometrical readings.

PLATE II.



The tabulation of the barometrical readings is shown in Plate No. 2. The heavy black lines represent the normal barometric curve for Denver for each month. Although this is practically the mean for the maximum and minimum readings, it represents, perhaps, more exactly, the barometric conditions for what we would call "fine weather;" that is for those days which are most exhilarating and freest from depressing conditions. In this, as in the other tables, the numbers at the tops of the squares represent the recorded misdemeanors in the public school for the month shown at the top of the column and the condition at the left. Since in this, as well as in the temperature and humidity tables, both maximum and minimum readings were tabulated without distinction in this summary, two readings for each day are represented, making a

total twice that of the number of misdemeanors. An inspection of the table shows that for days on which either of the readings was between 24.70 and 24.80 (practically normal), there were 200 tabulations, while 1,012 were without these limits. This is, perhaps, limiting the "normal zone" too narrowly. A study of the conditions, however, shows that a maximum reading above 24.90 and a minimum below 21.60, may with certainty be said to be abnormal, since but 32.5 per cent. are outside of those limits. Our table, however, shows 49 per cent. to be outside of them arguing that emotional excesses, as shown by a tendency on the part of the pupil to be unruly, vary with abnormal barometric conditions. We cannot say that we have here, cause and effect, since barometric abnormalities are always the conditions accompanying other peculiar meteorological states, and since it has been impossible to tabulate the data in such a way as to be able to compare all the conditions for a single day, with all those for another day, or with the normal, we can only say that such variations are concomitant.

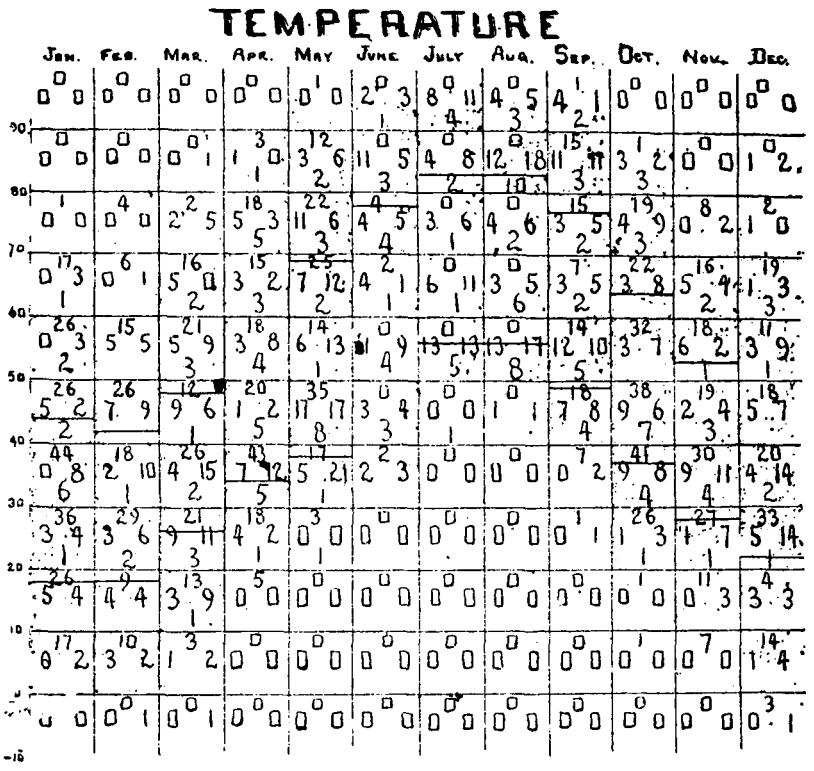
My deductions from this study, in spite of the fact that misdemeanors occurred on 25 per cent. of the days on which the barometer reached its maximum or minimum for the month, while the law of probability would give us but 6 per cent., would be that the direct effects of barometric pressure are the least of any of the conditions studied.

This deduction would be supported by the fact that in coming to Denver from the sea-level (a difference of 5 inches in barometric reading) or even going to the summit of Pike's Peak (a difference of 11 inches), no marked emotional excesses are noticeable.

In the study of the temperature table (Plate 3), it is necessary to bear in mind the fact alluded to in the last discussion — that the numbers (which are arranged similarly) represent maximum and minimum readings indiscriminately. The black lines show the means for both of these readings for each month. That is, for January, the mean maximum for the month was 44 degrees and the minimum 18 degrees Fahrenheit. It is safe to suppose that all the readings below the minimum mean are minimum readings, and all those above the maximum mean, maximum readings, while those between the two means are indiscriminately both. If this be a fair supposition, the figures beyond the means represent misdemeanors, while those between them, for each month, must be modified to put them upon the same basis.

This fact makes it difficult to compare abnormal thermometric conditions with the normal, but we can, with very interesting results, compare the two abnormalities — excessive heat and

PLATE III.



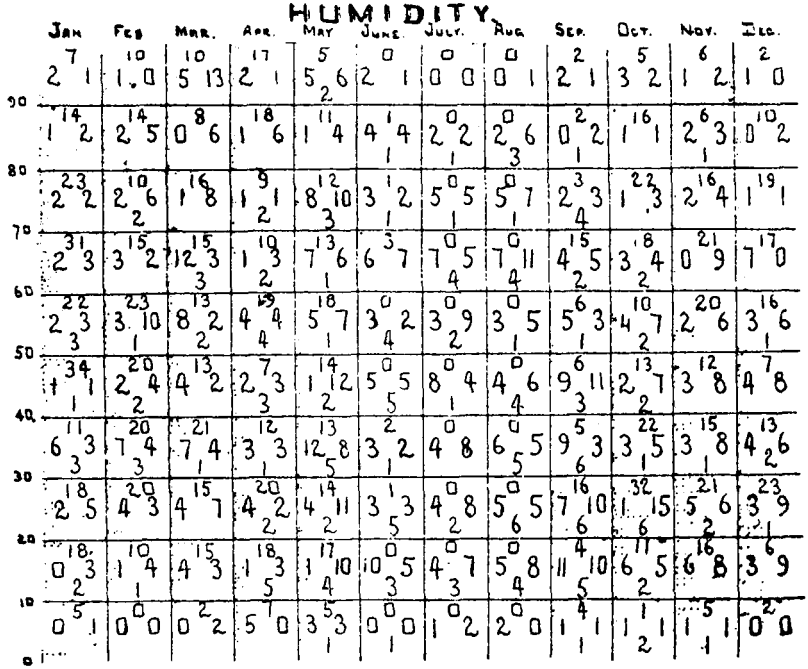
excessive cold — and note their seeming influence upon neurotic states.

Every month, without exception, shows a great preponderance of misdemeanors on days when the heat was abnormal, over days when the cold was unusual, and this is particularly true for the warmer months. For instance: in April, 36 misdemeanors when the heat was abnormal, to 23 for a similar condition of cold; May, 37 to 4; September, 16 to 8. Since school is not in session during the hottest months of the year, this class of data cannot be studied for them, but the record of suicides shows the fatal effects of excessive heat. In July, for instance, 17 suicides during abnormal heat and none during abnormal cold. In August the proportion was 23 to 1.

In the winter time, judging from the notes of the school principals, from which I get my information regarding misdemeanors, the considerable number of punishments recorded for conditions

below the normal mean, were largely due to opportunity, rather than any necessity to work off superfluous energy. Many of the notes mention snow-balling, and other attractive sports of the winter season, as the cause of the youngster's tribulations, and since these could not be considered an element of probability in the warmer months—nor is there perhaps, anything quite so seductive to offset them — their effects may have been considerable upon our tabulation for the winter months.

PLATE IV.



In studying the humidity table (Plate 4), we must also note that the figures in the squares represent the two readings, maximum and minimum, for each day tabulated.

The mean humidity for Denver varies from 45 per cent. in the summer months, to 54 in January and February, though this curve is not shown upon the table. An inspection of the table shows that for each month, almost without exception, the readings for the decade of per cents. including the normal or average is less than for those more abnormal, making this, perhaps, the most interesting and conclusive of any class of data

studied. For example, for April the readings for each decade of per cents., beginning with the upper, are 17-18-9-10-19-7-12 20-18-7. Since for April, 48 per cent. is normal, and the reading for the decade 40-50 is 7, this point is well illustrated. It is not so well shown by some of the months, still with all the same general curve may be observed. When, too, we take into consideration, the fact that, as was the case with the thermometer readings, those nearer the normal represent the less important readings (from our point of view) of days already represented by a more abnormal reading, the effect of excessive moisture, as shown by a great humidity, and excessive dryness, as shown by small humidity, is all the more marked. This may be shown more empirically by comparing percentages. For instance, the percentage of days having tabulated misdemeanors (out of the 606 considered), on which the humidity was between 90-100, was 11 (per cent). The actual percentage of days during the school year, on which that excessive amount is reached, is 3.6 for humidities between 80-90 as shown by our tables, 16 per cent. ; actual, 7.6. Between humidities of 10 and 20, about 16 per cent. shown by our tables to 25 per cent., actual. Between 0 and 10, 5 per cent. to 3 per cent.

We have here, seemingly, evidence that abnormal conditions of moisture, whether great or small, effect mental states, though we are forced to conclude that the direct physiological influence of the two abnormalities differ, and very likely the neurotic states tending to produce irritableness in our children are dissimilar.

The stickiness and unpleasant sensations common to days when the humidity is great, together with the fact that the sensible temperature is greater under such conditions, might give rise to a sensorial irritableness which could not be experienced when those conditions were wanting. It is also just as true that the very reverse of those conditions are accompanied by electrical states, as yet but little studied, which seem to be productive of, or at least accompanied by, neurotic abnormalities which are very pronounced.

In looking over the monthly bulletins at the Weather Bureau, I was much amused at the remarks appended by a very observing voluntary official in one of the mountain towns. One statement, which bears upon the point in question, was as follows: "Humidity for the month very low, which has brought about an electrical condition which has set every one to fussing and fighting." Exactly what this electrical condition so tersely commented upon by the weather observer is, is not known, nor has the Bureau studied it sufficiently to make any reports upon it. It is certain, however, that in Colorado it is present during periods of the lowest humidity, even lower than are ever reached

in the moister regions of the lower altitudes, and an interesting comparison might be made between the readings of this table, and similar data collected in those altitudes.

A tabulation of the days on which the precipitation was one one-hundredth of an inch, or more, shows that 106 misdemeanors, or a little more than 16 per cent., occurred under those conditions.

A comparison with the normal number of rainy days for the months of the school year, which is also 16 per cent., gives us no increased probability of misdemeanors on rainy or snowy days.

Of the 606 days tabulated, 75 were of the denomination classified at the Weather Bureau as "cloudy," 256 "partly cloudy," and 271 "clear," giving percentages of 12.5, 42.6, and 44.9 respectively. Comparing these percentages with 15.5, 43.5, and 42, the normal percentages for the same classes of days, we have little reason to believe that the character of the day has any marked effect.

To summarize in brief the conclusions arrived at in this paper:

First. The time of year seems to have little effect.

Second. Abnormal movement of wind, as shown by maximum velocity, seems to increase misdemeanors 20 per cent. As shown by total movement 66 per cent.

Third. Abnormal barometric pressure, either great or small (or the conditions accompanying such abnormality), seems to increase them 50 per cent.

Fourth. An excessive humidity has the most marked effect. Humidities between 90 and 100 increasing the probability 300 per cent. Between 80 and 90 increasing it 104 per cent.

Fifth. Precipitation seems to have no effect whatever.

Sixth. The character of the day, little or no effect.

We must not, however, consider these factors independently of one another, nor dogmatically conclude that each is of the importance these figures would imply. A much more exhaustive study, from a vastly greater number of observations, would be necessary to arrive at any definite conclusions, and I offer this paper as a mere reconnoitre into what seems to have been hitherto, unexplored territory.